

Appl. Serial No. 09/736,354
Atty Dckt No. LSUI-27,721US
AMENDMENT AND RESPONSE

In The CLAIMS

Claims 1-15 (Cancelled)

Claims 19, 24, 28-36, and 50-59 (Withdrawn) (Note: are repeated below).

Claim 16. (Currently Amended) ~~In~~ A circuit in which a current interrupter is connected to interrupt current to a load, the improvement comprising:

an indicator providing an indication of whether current is coupled to the load by the current interrupter; and

5 a passive network connected between the current interrupter and the indicator, said passive network biasing said indicator to provide a first indication of when current is flowing to the load, and a second indication of when current is interrupted by the current interrupter, in ~~an~~ AC or a DC circuit, for positive or negative ground.

Claim 17. (Previously Added) The circuit according to Claim 16, wherein said indicator comprises a bi-color, light emitting diode.

Claim 18. (Previously Added) The circuit according to Claim 17, wherein said network biases the light emitting diode to provide a voltage polarity there-across said first indicator, and an opposite voltage polarity in said second.

Claim 19. (Withdrawn) The circuit according to Claim 16, further ~~A circuit in which a current interrupter is connected to interrupt current to a load, comprising:~~
~~an indicator providing an indication of whether current is coupled to the load by the current interrupter;~~

~~a passive network connected between the current interrupter and the indicator, said passive network biasing said indicator to provide a first indication of~~

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when current is flowing to the load, and a second indication of when current is interrupted by the current interrupter;

wherein the current interrupter and the load are connected between a first node and a second node, and a third node is defined between the current interrupter and the load, and said passive network comprises:

a first resistor connected between the first node and a fourth node;
a second resistor connected between said fourth node and the second node;
a third resistor connected between the second node and a fifth node;
a rectifier connected between the third node and said fifth node for limiting current flow to one direction between the third and said fifth node;
said indicator connected between the third node and said fifth node; and
wherein said first, second and third resistors are sized and said rectifier is aligned for current to flow in a first direction through said indicator when the current is passing through the current interrupter and in a second direction when the current interrupter is interrupting current flow to the load.

Claim 20. (Currently Amended) The circuit according to Claim 16, A circuit in which a current interrupter is connected to interrupt current to a load, comprising:

an indicator providing an indication of whether current is coupled to the load by the current interrupter;

a passive network connected between the current interrupter and the indicator, said passive network biasing said indicator to provide a first indication of when current is flowing to the load, and a second indication of when current is interrupted by the current interrupter;

wherein the circuit breaker and the load are connected between a first node and a second node, and a third node is defined between the circuit breaker and the load, the circuit breaker having status output contacts which, when the circuit breaker is tripped, are selectively switched to output a status of the circuit breaker as being tripped, said passive network comprises:

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15 a first resistor connected between the first node and a fourth node;
 a second resistor connected between the third node and a fifth node;
 a rectifier connected in series with said second resistor between the third
node and said fifth node for limiting current flow to one direction between the third
and said fifth node;

20 said indicator connected between said fourth node and said fifth node;
 said fourth node connected to a first one of the status output contacts of the
circuit breaker;
 said fifth node connected to a second one of the status output contacts of the
circuit breaker;

25 a third one of the status output contact being connected to the second node,
and being switched between the first one and the second one of the status output
contacts according to whether the circuit breaker is passing current to the load or
interrupting current to the load due to an overload;
 wherein said first and second resistors are sized, and said rectifier is aligned

30 for current to flow in a first direction through said indicator when said current is
passing through the circuit breaker and in a second direction when the circuit breaker
is interrupting current flow to the load.

Claim 21. (Previously Added) The circuit according to Claim 20, further
comprising a test switch having a normally open contact connected to said fifth node,
and a normally closed contact connected to said fourth node, and a center contact
connect to the second node, wherein said test switch is selectively actuated to
5 selectively activate said indicator.

Claim 22. (Previously Added) The circuit according to Claim 21, further
comprising a second rectifier connected between said fifth node and said normally
open contact of said test switch, and said test switch connected to a plurality of
second rectifiers which are each connected in parallel circuits, with said plurality of
5 second rectifiers in said parallel circuits each being connected in series with nodes of

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respective one of a plurality of circuit breakers to simultaneously test respective indicators connected to respective ones of the plurality of circuit breakers.

Claim 23. (Currently Amended) The circuit according to Claim 22, further comprising a normally open relay, a first end of a coil of said relay connected to the second node and a second end of said coil of said relay connected in series with a third resistor to the first node, said second end of said coil of said relay and said resistor connected to a sixth node; and

5 a third rectifier connected between said sixth node and a seventh node, said seventh node being defined between said fifth node and the second one of the status output contacts of the circuit breaker;

10 a fourth rectifier connected in the circuit between the fifth node and the seventh node, wherein said fourth rectifier is connected between said seventh node and said fifth node for passing current in the same direction as current from said seventh node to said sixth node, and in the same direction as said second rectifier passed passes current from said normally open contact of said test switch to said seventh node;

15 a fifth rectifier connected across said first end and said second end of said coil of said relay, wherein said fifth rectifier is connected for passing current from the sixth node to the second node in the same direction as the third rectifier passed passes current from the seventh node to the sixth node; and

20 said output contacts of said normally open relay being connected to contact of a status connector.

Claim 24. (Withdrawn) The circuit according to Claim 16, A circuit in which a current interrupter is connected to interrupt current to a load, comprising: an indicator providing an indication of whether current is coupled to the load by the current interrupter;

a passive network connected between the current interrupter and the indicator, said passive network biasing said indicator to provide a first indication of

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when current is flowing to the load, and a second indication of when current is interrupted by the current interrupter;

wherein the circuit breaker and the load are connected between a first node and a second node, and a third node is defined between the circuit breaker and the load, the circuit breaker having status output contacts which, when the circuit breaker is tripped, are selectively switched to output a status of the circuit breaker as being tripped, said passive network comprises:

a first resistor connected between the first node and a fourth node;

a rectifier connected between the third node and a fifth node for limiting current flow to one direction between the third node and said fifth node;

said indicator connected between said fourth node and said fifth node;

a second resistor connected between said fourth node and a first one of the status output contacts of the circuit breaker;

said fifth node connected to a second one of the status output contacts of the circuit breaker;

a third resistor connected between a third one of the status output contacts and the second node;

the third one of the status output contacts being switched between the first one and the second one of the status output contacts according to whether the circuit breaker is passing current to the load or interrupting current to the load due to an overload; and

wherein said first, second and third resistors are sized, and said rectifier is aligned for current to flow in a first direction through said indicator when said current is passing through the circuit breaker and in a second direction when the circuit breaker is interrupting current flow to the load.

Claim 25. (Currently Amended) The circuit according to Claim 16, A circuit in which a current interrupter is connected to interrupt current to a load, comprising:
an indicator providing an indication of whether current is coupled to the load by the current interrupter;

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5 a passive network connected between the current interrupter and the indicator, said passive network biasing said indicator to provide a first indication of when current is flowing to the load, and a second indication of when current is interrupted by the current interrupter;

10 whrcin the circuit breaker and the load are connected between a first node and a second node, and a third node is defined between the circuit breaker and the load, the circuit breaker having power contacts which, when the circuit breaker is tripped, are selectively switched from a normally closed to normally open such that a center power contact is switched from connecting to the first one of the power contacts to a second one of the power contacts, and wherein the first one of the power contacts of said circuit breaker is connected to the third node and the center power contact is connected to the first node, said passive network comprising:

15 a first resistor connected between the first node and a fourth node;

 a rectifier connected between the third node and said fourth node for limiting current flow to one direction between the third node and said fourth node;

20 an indicator connected between said fourth node and a fifth node;

 a second resistor connected between said fifth node and the second node,

 said fifth node connected to a second one of the power output contacts of the circuit breaker; and

25 wherein said first and second resistors are sized, and said rectifier is aligned for current to flow in a first direction through said indicator when said current is passing through the circuit breaker and in a second direction when the circuit breaker is interrupting current flow to the load due to said circuit breaker being tripped.

Claim 26. (Currently Amended) The circuit according to Claim 16, A circuit in which a current interrupter is connected to interrupt current to a load, comprising:
an indicator providing an indication of whether current is coupled to the load by the current interrupter;

5 a passive network connected between the current interrupter and the indicator, said passive network biasing said indicator to provide a first indication of

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when current is flowing to the load, and a second indication of when current is interrupted by the current interrupter;

10 wherein said circuit is enclosed in a first housing which includes said passive network, and said current interrupter is enclosed in a circuit breaker housing which is separate from said first housing, said first housing having a first connection for mounting said a circuit breaker housing directly thereto and a second connection for mounting said first housing into a panel, such that said circuit breaker housing mounts to said first housing and said first housing mounts to said panel; and

15 said first housing having an indicator light visible from a forward end of said circuit breaker for providing two distinct light outputs of different color, one color according to whether the circuit breaker is providing power to the load and a second color according to whether the circuit breaker is in a tripped condition.

Claim 27. (Currently Amended) The circuit according to Claim 26, wherein said first housing has an L-shaped side profile.

Claim 28. (Withdrawn) An apparatus for determining whether a current interrupter connected between a power supply and a load is interrupting current to the load, wherein the current interrupter and the load are connected between a first node and a second node, and a third node is defined between the current interrupter and the load, said apparatus comprising:

 a first resistor connected between the first node and a fourth node;
 a second resistor connected between said fourth node and the second node;
 a third resistor connected between the second node and a fifth node;
 a rectifier connected between the third node and said fifth node for limiting current flow to one direction between the third and said fifth node;
 an indicator connected between the third node and said fifth node; and
 wherein said first, second and third resistors are sized and said rectifier is aligned for current to flow in a first direction through said indicator when the current

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is passing through the current interrupter and in a second direction when the current interrupter is interrupting current flow to the load.

Claim 29. (Withdrawn) The apparatus according to Claim 28, further comprising a first current limiting device between the second node and said fourth node, and a second current limiting device between the second node and said fifth node.

Claim 30. (Withdrawn) The apparatus according to Claim 28, further comprising a second rectifier connecting between the first node and said fourth node.

Claim 31. (Withdrawn) The apparatus according to Claim 30, further comprising a first current limiting device between the second node and said fourth node, and a second current limiting device between the second node and said fifth node.

Claim 32. (Withdrawn) The apparatus according to Claim 28, wherein said indicator is a bicolor LED.

Claim 33. (Withdrawn) The apparatus according to Claim 28, wherein said rectifier is a diode.

Claim 34. (Withdrawn) The apparatus according to Claim 30, wherein said first and second current limiting devices are current limiting diodes.

Claim 35. (Withdrawn) The apparatus according to Claim 34, wherein said current interrupter is one of a switch, a fuse or a circuit breaker.

Claim 36. (Withdrawn) the apparatus according to Claim 28, wherein said power supply is one of an AC current source or a DC current source.

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Claim 37. (Currently Amended) An apparatus for determining whether a circuit breaker connected between a power supply and a load is interrupting current to the load, wherein the circuit breaker and the load are connected between a first node and a second node, and a third node is defined between the circuit breaker and the load, the circuit breaker having status output contacts which, when the circuit breaker is tripped, are selectively switched to output a status of the circuit breaker as being tripped, said apparatus comprising:

5 a first resistor connected between the first node and a fourth node;

10 a second resistor connected between the third node and a fifth node;

15 a first rectifier connected in series with said second resistor between the third node and said fifth node for limiting current flow to one direction between the third and said fifth node;

an indicator connected between said fourth node and said fifth node;

20 said fourth node connected to a first one of the status output contacts of the circuit breaker;

25 said fifth node connected to a second one of the status output contacts of the circuit breaker;

a third one of the status output contact being connected to the second node, and being switched between the first one and the second one of the status output contacts according to whether the circuit breaker is passing current to the load or interrupting current to the load due to an overload; and

wherein said first and second resistors are sized, and said first rectifier is aligned for current to flow in a first direction through said indicator when said current is passing through the circuit breaker and in a second direction when the circuit breaker is interrupting current flow to the load.

Claim 38. (Currently Amended) The apparatus according to Claim 37, further comprising a first current limiting device in series with said first resistor between the first node and said fourth node and a second current limiting device in

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series with said first rectifier and said second resistor between the third node and said fifth node.

Claim 39. (Currently Amended) The apparatus according to Claim 37, further comprising a second rectifier in series with said first resistor and connecting between the first node and said fourth node.

Claim 40. (Currently Amended) The apparatus according to Claim 39, further comprising a first current limiting device in series with said first resistor and said second rectifier between the first node and said fourth node and a second current limiting device in series with said first rectifier and said second resistor between the third node and said fifth node.

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Claim 41. (Previously Added) The apparatus according to Claim 37, wherein said indicator is a bicolor LED.

Claim 42. (Previously Added) The apparatus according to Claim 37, wherein said rectifier is a diode.

Claim 43. (Previously Added) The apparatus according to Claim 39, wherein said first and second current limiting devices are current limiting diodes.

Claim 44. (Previously Added) The apparatus according to Claim 37, wherein said current interrupter is one of a switch, a fuse or a circuit breaker.

Claim 45. (Previously Added) The apparatus according to Claim 37, wherein said power supply is one of an AC current source or a DC current source.

Claim 46. (Previously Added) The apparatus according to Claim 37, wherein the first one of the status output contacts of the circuit breaker to which said fourth

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node is connected is normally closed, being closed when the circuit breaker is passing current to the load, and the second one of the status output contacts of the 5 circuit breaker to which said fifth node is connected is normally open, being closed when the circuit breaker is interrupting current flow to the load due to a circuit trip condition.

Claim 47. (Previously Added) The apparatus according to Claim 37, further comprising a test switch having a normally open contact connected to said fifth node, and a normally closed contact connected to said fourth node, and a center contact connect to the second node, wherein said test switch is selectively actuated to 5 selectively activate said indicator.

Claim 48. (Previously Added) The apparatus according to Claim 47, further comprising a second rectifier connected between said fifth node and said normally open contact of said test switch, and said test switch connected to a plurality of second rectifiers which are each connected in parallel circuits, with said plurality of 5 second rectifiers in said parallel circuits each being connected in series with nodes of respective one of a plurality of circuit breakers to simultaneously test respective indicators connected to respective ones of the plurality of circuit breakers.

Claim 49. (Currently Amended) The apparatus according to Claim 48, further comprising a normally open relay, a first end of a coil of said relay connected to the second node and a second end of said coil of said relay connected in series with a third resistor to the first node, said second end of said coil of said relay and 5 said resistor connected to a sixth node; and

a third rectifier connected between said sixth node and a seventh node, said seventh node being defined between said fifth node and the second one of the status output contacts of the circuit breaker;

10 a fourth rectifier connected in the circuit between the fifth node and the seventh node, wherein said fourth rectifier is connected between said seventh node

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and said fifth node for passing current in the same direction as current from said seventh node to said sixth node, and in the same direction as said second rectifier passed passes current from said normally open contact of said test switch to said seventh node;

15 a fifth rectifier connected across said first end and said second end of said coil of said relay, wherein said fifth rectifier is connected for passing current from the sixth node to the second node in the same direction as the third rectifier passed passes current from the seventh node to the sixth node; and

20 said output contacts of said normally open relay being connected to contact of a status connector.

Claim 50. (Withdrawn) An apparatus for determining whether a circuit breaker connected between a power supply and a load is interrupting current to the load, wherein the circuit breaker and the load are connected between a first node and a second node, and a third node is defined between the circuit breaker and the load, the circuit breaker having status output contacts which, when the circuit breaker is tripped, are selectively switched to output a status of the circuit breaker as being tripped, said apparatus comprising:

a first resistor connected between the first node and a fourth node;

a first rectifier connected between the third node and a fifth node for limiting current flow to one direction between the third node and said fifth node;

an indicator connected between said fourth node and said fifth node;

a second resistor connected between said fourth node and a first one of the status output contacts of the circuit breaker;

said fifth node connected to a second one of the status output contacts of the circuit breaker;

a third resistor connected between a third one of the status output contacts and the second node;

the third one of the status output contacts being switched between the first one and the second one of the status output contacts according to whether the circuit

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breaker is passing current to the load or interrupting current to the load due to an overload; and

wherein said first, second and third resistors are sized, and said first rectifier is aligned for current to flow in a first direction through said indicator when said current is passing through the circuit breaker and in a second direction when the circuit breaker is interrupting current flow to the load.

Claim 51. (Withdrawn) The apparatus according to Claim 50, further comprising a first current limiting device in series with said third resistor between the third one of the status output contacts and the second node.

Claim 52. (Withdrawn) The apparatus according to Claim 50, further comprising a second rectifier in series with said first resistor and connecting between the first node and said fourth node.

Claim 53. (Withdrawn) The apparatus according to Claim 52, further comprising further comprising a first current limiting device in series with said third resistor between the third one of the status output contacts and the second node.

Claim 54. (Withdrawn) The apparatus according to Claim 50, wherein said indicator is a bicolor LED.

Claim 55. (Withdrawn) The apparatus according to Claim 50, wherein said rectifier is a diode.

Claim 56. (Withdrawn) The apparatus according to Claim 50, wherein said first and second current limiting devices are current limiting diodes.

Claim 57. (Withdrawn) The apparatus according to Claim 50, wherein said current interrupter is one of a switch, a fuse or a circuit breaker.

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Claim 58. (Withdrawn) The apparatus according to Claim 50, wherein said power supply is one of an AC current source or a DC current source.

Claim 59. (Withdrawn) The apparatus according to Claim 50, wherein the first one of the status output contacts of the circuit breaker to which said fourth node is connected is normally closed, being closed when the circuit breaker is passing current to the load, and the second one of the status output contacts of the circuit breaker to which said fifth node is connected is normally open, being closed when the circuit breaker is interrupting current flow to the load due to a circuit trip condition.

Claim 60. (Currently Amended) An apparatus for determining whether a circuit breaker connected between a power supply and a load is interrupting current to the load, wherein the circuit breaker and the load are connected between a first node and a second node, and a third node is defined between the circuit breaker and the load, the circuit breaker having power contacts which, when the circuit breaker is tripped, are selectively switched from a normally closed to normally open such that a center power contact is switched from connecting to the first one of the power contacts to a second one of the power contacts, and wherein the first one of the power contacts of said circuit breaker is connected to the third node and the center power contact is connected to the first node, said apparatus comprising:

5 a first resistor connected between the first node and a fourth node;
a first rectifier connected between the third node and said fourth node for limiting current flow to one direction between the third node and said fourth node;
an indicator connected between said fourth node and a fifth node;
10 a second resistor connected between said fifth node and the second node,
said fifth node connected to a second one of the power output contacts of the circuit breaker; and
wherein said first and second resistors are sized, and said rectifier is aligned for current to flow in a first direction through said indicator when said current is

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20 passing through the circuit breaker and in a second direction when the circuit breaker is interrupting current flow to the load due to said circuit breaker being tripped.

Claim 61. (Previously Added) The apparatus according to Claim 60, further comprising a second rectifier connected between the second power contact of the circuit breaker and said fifth node, aligned for passing current in the same direction from said fifth node to said second power contact as said first rectifier is aligned for passing power from said fourth node to said third node."

5 Claim 62. (Previously Added) The apparatus according to Claim 61, further comprising a circuit test switch connected between said fifth node and said first node for selectively closing to test the indicator, and

a circuit member provided by one of a rectifier, a diode, or a resistor connected in series with said first rectifier between said third node and said fourth node, such that said indicator will activate when said circuit test switch is closed.

Claim 63. (Previously Added) The apparatus according to Claim 60, wherein said indicator is a bicolor LED.

Claim 64. (New) A circuit in which a current interrupter is connected to interrupt current to a load, comprising:

an indicator providing an indication of whether current is coupled to the load by the current interrupter; and

5 a passive network connected between the current interrupter and the indicator, said passive network biasing said indicator to provide a first indication of when current is flowing to the load, and a second indication of when current is interrupted by the current interrupter, in a DC circuit, for negative ground.

Claim 65. (New) The circuit according to Claim 64, wherein said indicator comprises a bi-color, light emitting diode.

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Claim 66. (New) The circuit according to Claim 65, whrcin said network biases the light emitting diode to provide a voltage polarity there-across said first indicator, and an opposite voltage polarity in said second.

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